

EMC TEST REPORT




Project No.	LBE091159	Revision No.	None
Applicant	Name of organization	Samsung Electronics Co., Ltd.	
	Address	416 Maetan 3-Dong, Yeongtong-Gu, Suwon-Si, Gyeonggi-Do, 443-742 Korea	
	Date of application	2009.04.14	
EUT Equipment Under Test	Kind of product	CCTV controller	
	Model No.	SCX-RD100	
		Variant Model	none
	Manufacturer	Tianjin Samsung Electronics Company 300457, TSEC12, 4th Avenue, TEDA, Tianjin, China	
New / Alternative / Permissive change information	*) New		
Applied Standards		FCC Part 15, Subpart B, Class A	
Issued date	2009.04.24		
Test result : Complied The equipment under test has found to be compliant with the applied standards. (Refer to the attached test result for more detail.)			
Tested by : Seung Beom Choi <div style="text-align: center; margin-top: 10px;"></div>		Reviewed by : No Cheon Park <div style="text-align: center; margin-top: 10px;"></div>	
<p>This report is the test result about the sphere accredited by KOLAS which signed the Mutual Recognition Arrangement of International Laboratory Accreditation Cooperation.</p> <p>The test results in this report only apply to the tested sample. This report must not be reproduced, except in full, without written permission from SEC EMC Laboratory.</p>			
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1. Summary of test results

1.1 Emission

The EUT has been tested according to the following specifications:

Test type	Applied standard	Result	Remarks
Conducted emission	FCC Part 15, Subpart B, Class A	Complied	Minimum margin is 24.4 dB at 2.39 MHz
Radiated emission		Complied	Minimum margin is 8.5 dB at 186.1 MHz

2. General Information












2.1 Test facility

The SEC EMC Laboratory is located on Samsung Electronics Co., Ltd. At 416 Maetan 3-Dong, Yeongtong-Gu, Suwon-Si, Gyeonggi-Do, South Korea.

All testing are performed in Semi-anechoic chambers conforming to the site attenuation Characteristics defined by ANSI C63.4, CISPR 22, 16-1 and 16-2. and Shielded rooms.

The SEC EMC Laboratory is operated as testing laboratory in accordance with the requirements of ISO/IEC 17025:2005.

2.2 Accreditation and listing

Laboratory Qualifications		Remarks
	KOLAS(Korea Laboratory Accreditation Scheme)	Accredited : 124
	Korea Communications Commission Radio Research Agency	Accredited : KR0004
	FCC(Federal Communications Commission)	Accredited : KR0004
	National Voluntary Laboratory Accreditation Program	Lab Code: 200623-0
	Norges Elektriske Materiellkontroll	Accredited : ELA 195
	VCCI (Voluntary Control Council for Interference by Information Technology Equipment)	C-2421,R-2224
	China Quality Certification Center	5-053, 5-054
	TUV Rhineland	H9354285
	GOST(GOSTSTANDART)	ROSTEST
	Elektrotechnicky Zkusebni Ustav	Reg. No.: 001
	IC(Industry Canada)	Assigned Code: 5871

3. Test Setup configuration

3.1 Test peripherals

The peripherals which were interconnected to the EUT during the test are as follows:

Item	Model No.	Serial No.	Manufacturer	Note
CCTV controller	SCX-RD100	-	Samsung	EUT
AC adapter	DAD-12050KA	-	Dream Elec.	-
CCTV camera	SCC-B2333	-	Samsung	-
AC adapter	DAD-12050KA	-	Dream Elec.	-

3.2 EUT operating mode(s)

To achieve compliance applied standard specification, the following mode(s) were made during compliance testing:

Operating Mode 1	CCTV camera in + RS-485 communication
Operating Mode 2	-
Operating Mode 3	-

3.3 Details of Sampling

Customer selected, single unit.

3.4 Cable description

The type(s) of cables which were connected to the ports (of the EUT) are as follows:

No.	From the port of EUT	To	Length[m]	Shielded[Y/N]
1	DC in	AC adapter	2.0	Yes
2	Video in	CCTV camera	0.5	Yes
3	Video out	75 ohm termination	1.0	Yes
4	RS-485	CCTV camera	0.3	Yes
5	RS-232	Cable termination	1.5	Yes
6	USB	Cable termination	1.0	Yes

3.5 EUT Description

The following features describe EUT represented by this report:

Item		Description
COAXIAL	Communication Method	COAXIAL INTERFACE
	Range	Max. 500m (with 5C-2V cable)
RS-232	Connector Type	D-SUB 9P
	Port	1 PORT
	BAUD RATE	4800/9600/19200/38400bps
RS-485	Connector Type	4P Terminal Type
	PORT	1 PORT
	BAUD RATE	600/1200/2400/4800/9600/ 19200/38400bps
USB PORT(USB2.0)		S/W PROGRAM UPLOAD
VIDEO IN/OUT		Composite Video 1.0Vp-p, 75ohm, Cable Compensation out (Select:S/L)
MULTI PROTOCOL		3 programs A) SAMSUNG, PANASONIC, PELCO-P, PELCO-D B) SAMSUNG, AD, ERNA, VICON, VCLTP C) SAMSUNG, DIAMOND, KALATEL
Environmental Conditions	Operating Temp.	-10°C ~ +50°C
	Humidity	Less than 90%
POWER		DC12V ± 10%
DIMENSIONS (WxHxD)		150(W) X 36(H) X 102(D)

3.6 Description of the EUT exercising method

The EUT exercise program used during EMI and Immunity (EMS) testing was the SEC EMC Laboratory standardized test program for MS Windows. The program repetitively sends a screen of H – Character to the display. Connect video output of computer on EUT's PC IN(D-sub)port and scrolled H – character continuously on EUT's screen.

Also, when EUT has loudspeaker, it was regenerative through EUT's audio input reproducing "digital white noise" by MS Windows Media Player in the computer.

Examples of functions defined by the manufacturer to be evaluated during testing include the following:

3.7 Performance Criteria

Performance criterion A

The equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

Performance criterion B

After the test, the equipment shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed, after the application of the phenomena below a performance level specified by the manufacturer, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance.

During the test, degradation of performance is allowed. However, no change of operating state or stored data is allowed to persist after the test.

If the minimum performance level (or the permissible performance loss) is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.

Performance criterion C

Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions.

Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

3.8 Measurement uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus: (According to CISPR 16-4 and UKAS Lab 34.)

3.8.1 Emission

Test type		Measurement uncertainty (C.L. 95%, k = 2)
Conducted Disturbance	Main terminal	± 3.50 dB
	10/100 Base LAN	± 2.80 dB
	1000 Base LAN	± 2.80 dB
	TEL line	± 2.80 dB
Radiated Disturbance	Horizontal	± 5.00 dB
	Vertical	± 5.03 dB
Harmonics current		7.5 %
Voltage fluctuation & Flicker		5.8 %

4. Results of individual test

4.1 Conducted emission

Both conducted lines are measured in Quasi-Peak and Average mode, including the worst-case data points for each tested configuration.

The EUT measured in accordance with the methods described in standards.

Limits for conducted disturbance at mains ports of class A

Frequency range Limits MHz	Limits dB(μV)	
	Quasi-peak	Average
0,15 to 0,50	79	66
0,50 to 30	73	60

Limits for conducted disturbance at the mains ports of class B

Frequency range Limits MHz	Limits dB(μV)	
	Quasi-peak	Average
0,15 to 0,50	66 to 56 a	56 to 46 a
0,50 to 5	56	46
5 to 30	60	50

a Decreasing linearly with the logarithm of the frequency

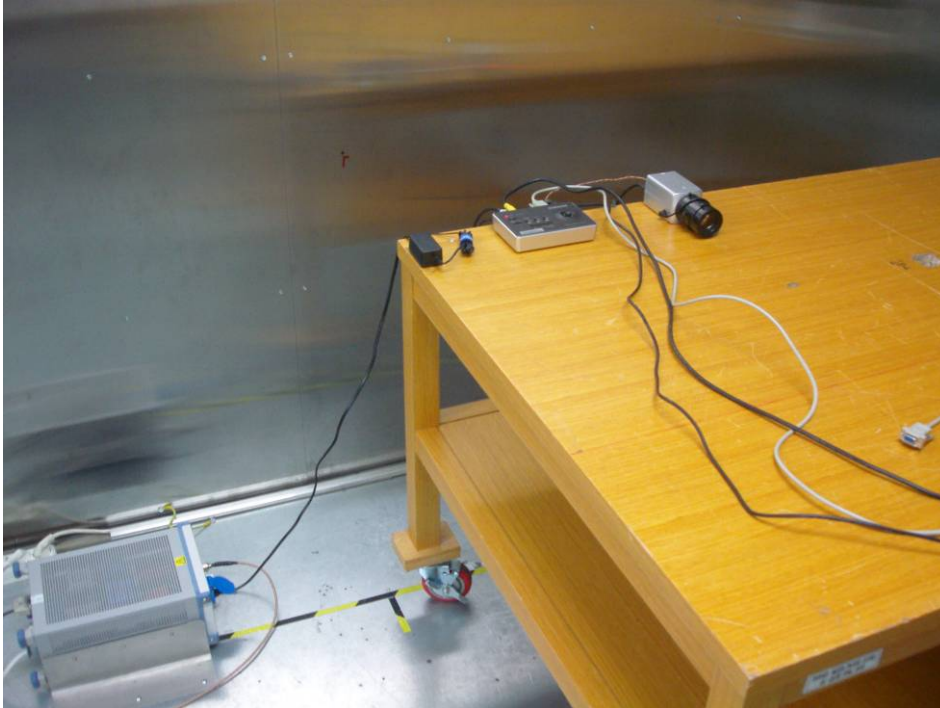
If the reading on the measuring receiver shows fluctuations close to the limit, the reading shall be observed for at least 15 seconds at each measurement frequency, the highest reading shall be recorded, with the exception of any brief isolated high reading (which shall be ignored).

4.1.1 Test instrumentation

Test instrumentations which were used in the Conducted disturbance test are as follows;

Test instrumentation	Model name	Manufacturer	Serial or Firmware (No./Ver.)	Calibration	
				Date	Interval (Month)
Field strength meter	ESCS30	R&S	100104	2008-06-25	12
L.I.S.N	ENV216	R&S	100454	2008-11-28	12

4.1.2 Photograph of the test Configuration



4.1.3 Test result

Test date	2009.04.15		Test engineer		Seung Beom Choi	
Climate condition	Ambient temperature	24.5 °C	Relative humidity	23 %	Atmospheric pressure	100.4 kPa
	Test place					
DM Shielded Room #1						

4.1.4 Test data

■ Operating Mode: CCTV camera in + RS-485 communication

Test Information

Test Description: SCX-RD100
Operating Conditions: CCTV camera controlling
Operator Name: SB Choi
Comment:

Hardware Setup: Voltage_ITE - [EMI conducted]

Subrange 1

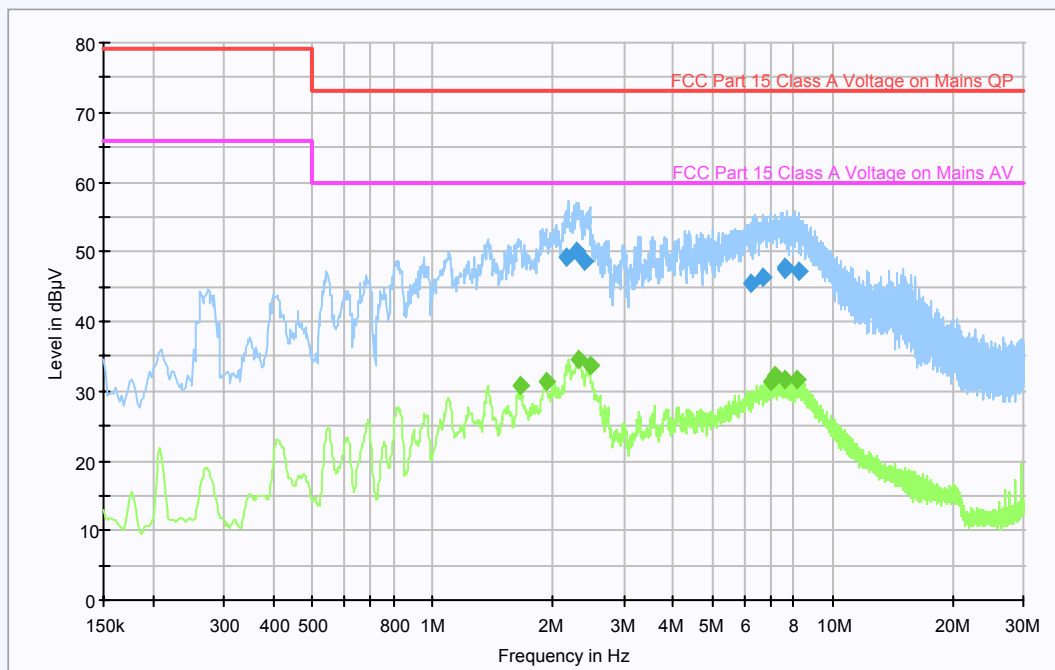
Frequency Range: 150kHz - 30MHz

Receiver: ESCS 30 [ESCS 30]
@ GPIB0 (ADR 18), SN 0, FW 2.30 02.01 02.36

Signal Path: ESCS 30-LISN
Correction Table: Cable loss_Receiver-2-LISN

LISN: LISN_ITE
Correction Table (Line 0): Factor_ENV216_100454_N
Correction Table (Line 1): Factor_ENV216_100454_L1

Conducted Emission_FCC P15 class A



Final Measurement Detector 2

Frequency (MHz)	Average (dB μ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
1.648400	30.8	N	9.7	29.2	60.0
1.923000	31.4	N	9.7	28.6	60.0
2.322000	34.4	N	9.8	25.6	60.0
2.467400	33.8	N	9.8	26.2	60.0
7.032000	31.5	N	9.8	28.5	60.0
7.173600	32.2	N	9.8	27.8	60.0
7.588400	31.7	N	9.9	28.3	60.0
8.106600	31.6	N	10.0	28.4	60.0

Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dB μ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
2.150000	49.2	N	9.8	23.8	73.0
2.288400	50.1	N	9.8	22.9	73.0
2.391600	48.6	N	9.9	24.4	73.0
6.269400	45.5	N	9.9	27.5	73.0
6.723000	46.4	N	9.9	26.6	73.0
7.558200	47.7	N	9.9	25.3	73.0
7.559200	47.6	N	9.9	25.4	73.0
8.253000	47.2	N	10.0	25.8	73.0

4.2 Radiated emission

The EUT's antenna terminal connected to a 75 ohm resistive termination equal to the impedance specified for the antenna.

Starting with the front of the receiver under test facing the measuring antenna, the measuring antenna is adjusted for horizontal polarization measurement and its height varied between 1 m and 4 m until the maximum reading is obtained. The receiver under test is then rotated about its centre until the maximum meter reading is obtained, after which the measuring antenna height is again varied between 1 m and 4 m and the maximum reading noted.

The procedure is repeated for vertical polarization of the measuring antenna, the height being varied from 2m to 4 m in this case.

Limits of Radiated Emission

Frequency MHz	Field Strength $\mu\text{V/m}$	
	Class A at distance of 10 meters	Class B at distance of 3 meters
30 to 88	90	100
88 to 216	150	150
216 to 960	210	200
Above 960	300	500

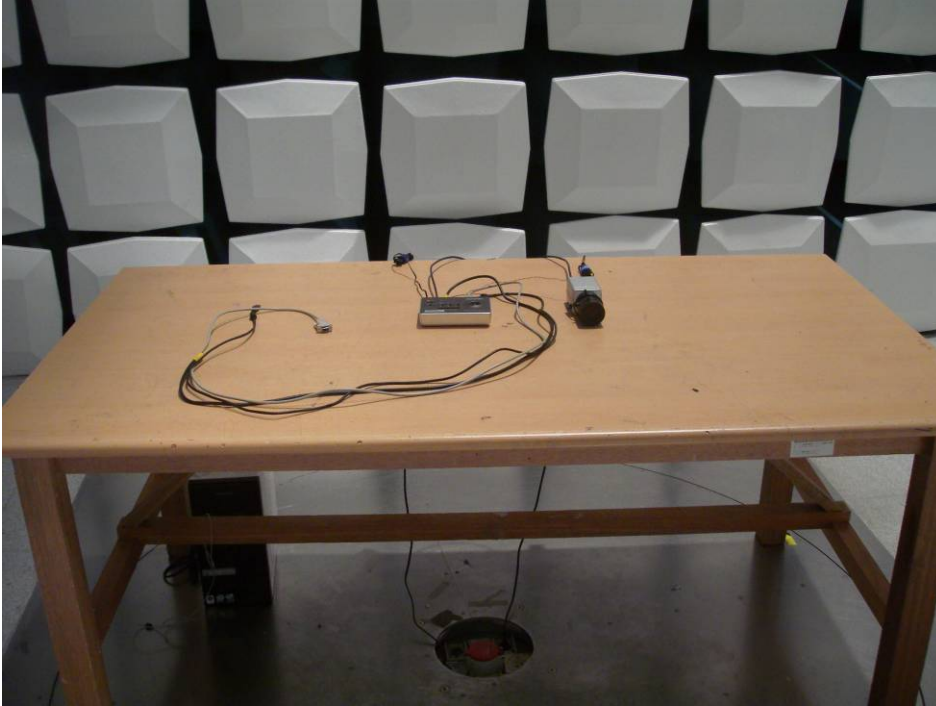
4.2.1 Test instrumentation

Test instrumentations which were used in the Radiated disturbance are as follows:

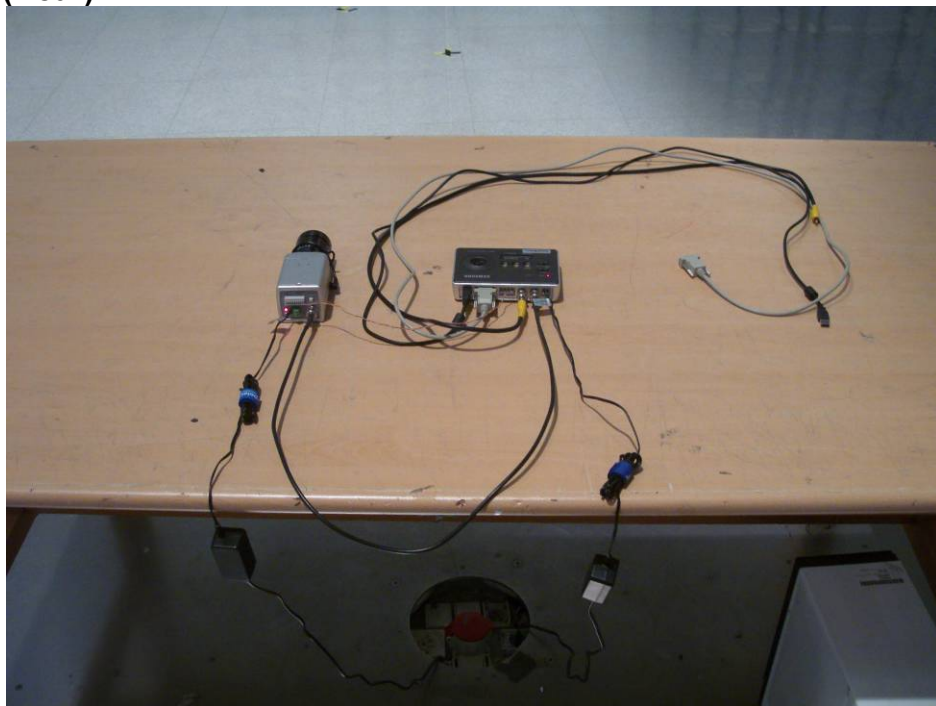
Test instrumentation	Model name	Manufacturer	Serial or Firmware (No./Ver.)	Calibration	
				Date	Interval (Month)
EMI Test Receiver	ESCS30	R&S	839809/002	2008-06-16	12
Spectrum Analyzer	E7405A	Agilent	MY42000052	2009-01-09	12
Ant. Mast	MA4000	inn-co	-	N/A	N/A
Mast Controller	CO2000	inn-co	-	N/A	N/A
Turntable Controller	HD100	inn-co	-	N/A	N/A
Amplifier	310N	SONOMA	251677	2009-03-26	12
RF selector	NS4900	TOYO	-	N/A	N/A
Bi-log Antenna	CBL6112B	SCHAFFNER	2953	2008-04-15	24

4.2.2 Photograph of the test Configuration

(Front)



(Rear)

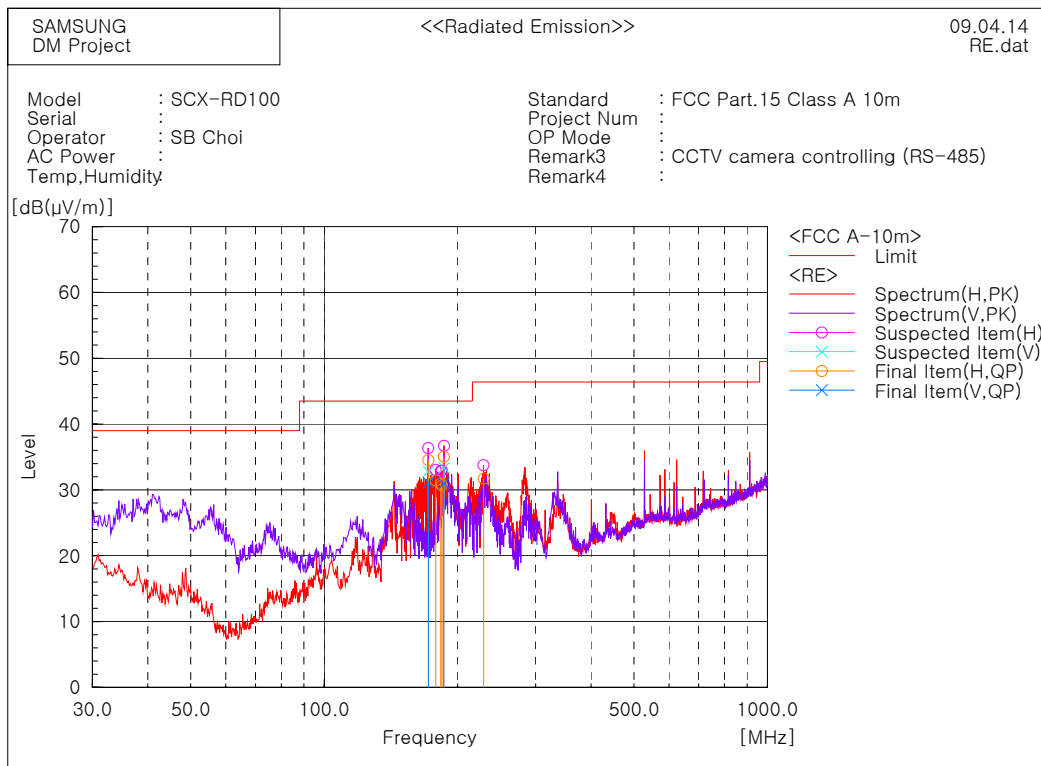


4.2.3 Test results

Test date	2009.04.14		Test engineer		Seung Beom Choi	
Climate condition	Ambient temperature	26.9 °C	Relative humidity	12 %	Atmospheric pressure	100.4 kPa
	Test place DM 10m Semi-Anechoic Chamber					

4.2.4 Test data

■ Operating Mode: CCTV camera in + RS-485 communication



Final Result

--- Horizontal Polarization (QP)---

No.	Frequency [MHz]	Reading [dB(μV)]	c.f [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Remark
1	171.815	54.3	-19.8	34.5	43.5	9.0	
2	178.555	51.3	-19.9	31.4	43.5	12.1	
3	183.265	51.0	-20.0	31.0	43.5	12.5	
4	184.440	50.8	-20.1	30.7	43.5	12.8	
5	186.135	55.2	-20.1	35.1	43.5	8.5	
6	229.045	50.9	-19.2	31.7	46.4	14.7	

--- Vertical Polarization (QP)---

No.	Frequency [MHz]	Reading [dB(μV)]	c.f [dB(1/m)]	Result [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Remark
1	171.815	50.9	-19.8	31.1	43.5	12.4	
2	186.135	51.1	-20.1	31.0	43.5	12.5	

Appendix A – EUT photography (Front)



(Rear)

